

Printed Pages – 4

Roll No.

328674(28)

B. E. (Sixth Semester) Examination, April-May 2020

(New Scheme)

(Et & T Engg. Branch)

**ELECTRONIC ENGINEERING MATERIALS &
COMPONENTS**

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all the questions. Part (a) of each question is compulsory and carries 2 marks.. Attempt any two from (b), (c) & (d) and carries 7 marks.

Unit-I

1. (a) Write the composition of Photoresist material used in Photolithography.

2

[2]

- (b) A uniformly doped P-type Semi-conductor has a background concentration of $10^{15}/\text{cm}^3$. Phosphorous is diffused into P-type substrate at 1100°C . Solid solubility of Phosphorous in Si is $10^{19}/\text{cm}^3$. Find Junction Depth. Given $\text{erfc}[2.75] = 10^{-4}$, $D = 10^{-14} \text{ cm}^2/\text{sec}$, $t = 15 \text{ min}$. 7
- (c) Describe the fabrication processes of a PN Junction diode. 7
- (d) Discuss Diffusion process in monolithic IC. 7

Unit-II

2. (a) Define Polarization. 2
- (b) Derive Claussius-Mosotti Relation for dielectric constant of solids. 7
- (c) Describe any **two** of the given below : 7
- (i) Static Dielectric constant
 - (ii) Dipole moment
 - (iii) Internal fields in solid and liquids

[3]

- (d) A Dielectric material contains 2×10^{19} polar molecules/ m^3 , each of the dipole moments is $1.8 \times 10^{-27} \text{ C-m}$. Assuming that all the dipoles are aligned in the direction of the electric field $E = 10^5 a_x \text{ V/m}$, Find the polarization, the electric susceptibility & the Relative Permittivity. 7

Unit-III

3. (a) Write the significance of + and - sign of susceptibility for a magnetic material with example. 2
- (b) The magnetic susceptibility of Fe_2O_3 is 1.4×10^{-3} . Calculate the flux density & Magnetization when it is subjected to a magnetic field of 10^6 A/m . 7
- (c) Explain the origin of permanent dipole moment in matter in detail. 7
- (d) Discuss Ferromagnetic Domain, Spontaneous Magnetization & Coercive forces. 7

Unit-IV

4. (a) What are the factors which affect Resistivity of metals? 2

- (b) A conduction wire has a resistivity of $3 \times 10^{-8} \Omega\text{-m}$ at room temperature. The fermi energy for such a conduction is 4 eV. There are 5.8×10^{28} electron/ m^3 . Calculate : 7
- (i) Mobility & Relaxation time
 - (ii) Average drift velocity of electron when electric field applied to conductor is 1 V/Cm.
 - (iii) Velocity of an electron with fermi energy.
- (c) Derive the law relating thermal conductivity and electrical conductivity of metals. 7
- (d) Derive Ohms law relating relaxation time of electrons. 7

Unit-V

5. (a) Write two uses of trimmer capacitor. 2
- (b) Explain the characteristics of Resistor in detail. 7
- (c) What are the design considerations for Electronic audio transformer? 7
- (d) Explain the selection factors considered for different types of capacitor. 7